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### **Dinosaur National Monument**

**Dinosaur National Monument, located on both sides of the Colorado-Utah state border, covers 853 sq km (329 sq mi). It is known for the many dinosaur remains found in an outcropping discovered there in 1909 and for several spectacular canyons created by the Green River and its tributary, the Yampa. The canyons, the highest of which is the Canyon of Lodore (1,020 m/3,350 ft deep), contain evidence of prehistoric Indian life. The area became a national monument in 1915.**

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International Journal of

Environmental Health Research  
The Journal of the International Association of Environmental Health Researchers  
Volume 1, Number 1, 1991  
Published by Oxford University Press  
Aimed at the health of the environment  
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Published by Oxford University Press  
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## **Apatosaurus**

**{uh-pa-tuh-sawr'-uhs}**

Apatosaurus was one of a number of giant, plant-eating DINOSAURS that roamed western North America during the Late JURASSIC PERIOD, more than 140 million years ago. The animal probably will remain better known for some time under the name Brontosaurus, because this name has been used in many books and films about dinosaurs. Paleontologists use the name Apatosaurus, however, because the first fossil fragment of the animal was so labeled, and by scientific convention the first name given is the one accepted. Apatosaurus and other giants such as BRACHIOSAURUS, DIPLODOCUS, and Camarasaurus constitute the suborder Sauropoda. These five-toed, long-necked dinosaurs were the dominant herbivores of their time. Their fossils occur in abundance in rock formations in Utah, Colorado, and Wyoming.

Apatosaurus had an enormous, barrel-like body supported by thick, heavy legs. Its tail and neck were long and stout. More than 25 m (82 ft) in total length, it weighed from 18-32 metric tons (20-35 U.S. tons). The skull was elongated and had short but pointed teeth. Apatosaurus skeletons are usually headless when they are found, however, because of fragile skull and neck connections. When the American paleontologist O. C. MARSH uncovered the first such skeleton, in 1879, he paired it with a wrong skull found nearby—that of the dinosaur now known as Camarasaurus. As a result, Apatosaurus was depicted as having a snub-nosed head with peglike teeth until the late 1970s, when the error was corrected.

Traditionally, paleontologists have regarded Apatosaurus as semiaquatic, feeding and wallowing in lakes, swamps, and rivers, because they believed that the animal's enormous weight was too great for the legs to bear and that it therefore needed to live in water to support its weight. Using this line of reasoning, some scientists suggested that the animal's long neck permitted it to breathe while at depths of 6-8 m (20-25 ft). This theory is flawed, however, because water pressures at depths of only a few meters would have been too great to permit the animal to breathe. More recently it has been suggested that all of the sauropods lived on land, using their long necks to reach and browse on treetop foliage.

**John H. Ostrom**

**Bibliography:** Alexander, R. McNeill, *The Dynamics of Dinosaurs and Other Extinct Giants* (1989); Dixon, Donald, et al., *The Macmillan Illustrated Encyclopedia of Dinosaurs and Prehistoric Animals* (1988); Lambert, David, *The Dinosaur Data Book* (1990).

[illegible]

## Archaeopteryx

{ahr-kee-ahp'-tur-iks}

The extinct Archaeopteryx ( Greek: archoios, "ancient"; pteryx, "wing") is the oldest known bird, although the skeletal remains of a primitive birdlike form discovered in 1986 are taken as evidence by some scientists that birds lived 75 million years before Archaeopteryx. About the size of a crow, Archaeopteryx weighed about 200-500 g (7-18 oz). Besides having feathers, Archaeopteryx was birdlike in having a furcula (wishbone), a big toe rotated backward to oppose the other toes in a gripping adaptation, and some fused wrist bones. Judging from the skull, the BRAIN had reached a stage of organization between that of the modern REPTILE and the more advanced BIRD. Weighing a little more than a gram (0.04 oz), the brain included a large cerebrum and cerebellum, indicating a high level of sensory perception and neuromuscular coordination. Reptilian features included a long, flexible tail, teeth, three complete clawed fingers, and abdominal ribs. The limb bones were solid, lacking avian air sacs. It is not known if the sternum (breastbone) possessed a keel.

Archaeopteryx figured importantly in the heated 19th-century debates about Charles Darwin's theory of the origin of species by NATURAL SELECTION. Current opinions on its origin and habits differ. One theory assumes that birds, through Archaeopteryx, are descended from a coelurosaurian dinosaur akin to COMPSOGNATHUS. Feathers probably evolved as insulating mechanisms--important to active vertebrates-- and only later evolved into mechanisms for flight. Some paleontologists suggest that several active dinosaur forms developed feathers. Whether Archaeopteryx was capable of flapping or gliding flight, or was a fast-running ground dweller is conjectural. Six skeletal specimens of Archaeopteryx showing traces of feathers have been found in Upper JURASSIC limestones. In 1985 some scientists alleged that the most famous one, now in the British Museum, was a forgery; paleontologists later concluded that it was genuine.

Wann Langton, Jr.

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## Iguanodon

{ig-wan'-uh-dahn}

Iguanodon was a bipedal herbivorous ornithischian DINOSAUR whose fossils appear in Late Jurassic and Early Cretaceous rocks. With massive bodies weighing more than 6 metric tons (13,200 lb), iguanodons stood up to 4.9 m (16 ft) high and were up to 9.5 m (31 ft) long. The jaws, lined with broad, flattened teeth, ended in the front with a toothless, horny beak. Arm-like forelimbs had five-fingered hands with a large sharp bony spike in place of a thumb. Four-toed feet (three functional toes and a fourth very small one) produced birdlike tracks that are preserved in certain strata. The tracks indicate that the Iguanodon was a herding animal.

Iguanodon specimens have been found principally in Europe, with fragmentary remains recently reported from the United States, in Utah, and from Mongolia. Among the first dinosaurs to be discovered (in England in 1822), Iguanodon became one of the best known through the discovery in 1878 of some 33 skeletons in a Belgian coal mine. The name (Greek for "iguana tooth") alludes to a vague resemblance of the teeth to those of the existing but unrelated Iguana lizard.

Wann Langston

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## **Nanosaurus**

{nay'-nuh-sohr-uhs}

Nanosaurus (from the Greek words nanos, "dwarf," and sauros, "lizard") was a small, functionally bipedal, herbivorous ornithischian dinosaur; its length is estimated to have been 1.37 m (4.5 ft). Fossil remains of much of the skeleton have been found in Colorado and Utah. Nanosaurus had an abbreviated trunk, with forelimbs half as long as the short-thighed hind limbs; it was probably a fast runner. Its hind feet bore four toes with claws, but the first digit was so short that the foot was essentially three-toed and birdlike. Nanosaurus belonged to the Late Jurassic Age (155 to 135 million years ago).

Abstract

(Key-words)

Abstract (from the Greek word "abstract") means "to draw out" or "to separate from the concrete." In this sense, the abstract is a statement of the general principles or concepts that underlie a particular subject or field of study. It is a statement of the "essence" of the subject, rather than a statement of its "facts" or "details." The abstract is usually written in a concise and clear manner, and it is often used as a guide to the main points of a longer work. It is also used as a means of summarizing a large body of information, and it is often used in the form of a list or a table of contents. The abstract is an important part of any scientific or technical work, and it is essential for the reader to understand the main points of the work before reading the full text. The abstract is also used as a means of communicating the results of a study to a wider audience, and it is often used in the form of a paper or a book review. The abstract is a key part of any scientific or technical work, and it is essential for the reader to understand the main points of the work before reading the full text.